REMARKS

The present application was filed on October 9, 2001 with claims 1 through 32. Claims 1 through 32 are presently pending in the above-identified patent application. Claims 1, 16-18, 23, and 29 are proposed to be amended and new claims 33-36 are proposed to be added herein. The present amendment is accompanied by a petition fee for extension of time (one month).

In the Office Action, the Examiner rejected claims 16-18 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner also rejected claims 1-32 under 35 U.S.C. §103(a) as being unpatentable over the admitted prior art in view of Malamy et al. (United States Patent Number 5,353,425).

The present invention is directed to a method and apparatus for locking the most recently accessed frames in a cache memory. The most recently accessed frames in a cache memory are likely to be accessed by a task again in the near future. The most recently used frames may be locked at the beginning of a task switch or interrupt to improve the performance of the cache. The list of most recently used frames is updated as a task executes and may be embodied, for example, as a list of frames addresses or a flag associated with each frame. The list of most recently used frames may be separately maintained for each task if multiple tasks may interrupt each other. An adaptive frame unlocking mechanism is also disclosed that automatically unlocks frames that may cause a significant performance degradation for a task. The adaptive frame unlocking mechanism monitors a number of times a task experiences a frame miss and unlocks a given frame if the number of frame misses exceeds a predefined threshold.

The specification and claim 23 have been amended to correct typographical errors.

Section 112 Rejections

Claims 16-18 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 16, the Examiner asserts that "16" should be "15" in the claim.

Claims 16-18 have been amended in accordance with the Examiner's suggestion and Applicants respectfully request that the rejections under section 112 be withdrawn.

Independent Claims 1, 15, 23 and 29

5   Independent claims 1, 15, 23, and 29 were rejected under 35 U.S.C. §103(a) as being unpatentable over the admitted prior art in view of Malamy et al.

In particular, the Examiner asserts that Malamy teaches locking pages or blocks in the cache in accordance with a most recently used locking scheme.

Applicants note that Malamy teaches a scheme that prevents the most
10   recently used lines in a cache from being replaced when the cache controller is forced to replace a cache memory line. The most recently used cache lines are thus blocked from being replaced, *regardless of the task they are associated with and regardless of whether a task is interrupted by another task.* The present invention, alternatively, recognizes that the most recently accessed frames in a cache memory are likely to be accessed by a task
15   again in the near future. Thus, the most recently used frames *associated with a task* may be locked in accordance with the present invention at the beginning of a task switch or interrupt, and are thus available when an interrupted task resumes execution (to improve the performance of the cache). Independent claims 1 and 29, as amended, require locking a number of most recently used frames *associated with a task.* Malamy, therefore,
20   actually teaches away from the present invention by teaching to block the replacement of the most recently used cache lines regardless of the task they are associated with. Independent claims 15 and 23 require locking said number of said most recently used frames *if a task is interrupted by another task.*

Thus, Malamy does not disclose or suggest locking a number of most
25   recently used frames associated with a task, as required by independent claims 1 and 29, as amended, and does not disclose or suggest locking said number of said most recently used frames if a task is interrupted by another task, as required by independent claims 15 and 23.

New Claims 33-36

30   New claims 33-36 have been added to more particularly point out and distinctly claim various features of the invention, consistent with the scope of the

originally filed specification, in order to give applicant the protection to which he is entitled. No new matter is introduced. Support for this material is set forth at pages 4-8 of the originally filed specification. The Examiner has previously considered the subject matter presented in new claim 33-36 when rejecting, for example, claims 23-25 and 27.

5   More specifically, claim 33 recites a monitor for monitoring a number of most recently used frames; and an adaptive frame locking mechanism for locking said number of said most recently used frames if a task is interrupted by another task.

As Applicants previously noted, Malamy teaches a scheme that prevents the most recently used lines in a cache from being replaced when the cache controller is

10   forced to replace a cache memory line. The most recently used cache lines are thus blocked from being replaced, *regardless of the task they are associated with and regardless of whether a task is interrupted by another task.* The present invention, alternatively, recognizes that the most recently accessed frames in a cache memory are likely to be accessed by a task again in the near future. Thus, the most recently used

15   frames *associated with a task* may be locked in accordance with the present invention at the beginning of a task switch or interrupt, and are thus available when an interrupted task resumes execution (to improve the performance of the cache). Independent claim 33 requires locking said number of said most recently used frames *if a task is interrupted by another task.*

20   Thus, Malamy does not disclose or suggest locking said number of said most recently used frames if a task is interrupted by another task, as required by independent claim 33.

Allowance of claims 33-36 is believed to be warranted.

Dependent Claims 2-14, 16-22, 24-28, 30-32 and 34-36

25   Dependent claims 2-14, 16-22, 24-28 and 30-32 were rejected under 35 U.S.C. §103(a) as being unpatentable over the admitted prior art in view of Malamy et al.

Claims 2-14, 16-22, 24-28, 30-32, and new claims 34-36 are dependent on claims 1, 15, 23, 29, and 33, respectively, and are therefore patentably distinguished over the admitted prior art and Malamy et al. (alone or in any combination) because of their

30   dependency from amended independent claims 1, 15, 23, 29, and 33 for the reasons set

forth above, as well as other elements these claims add in combination to their base claim.

All of the pending claims following entry of the amendments, i.e., claims 1-36, are in condition for allowance and such favorable action is earnestly solicited.

5   If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,

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